



State of California—Health and Human Services Agency  
**Department of Health Services**



ARNOLD SCHWARZENEGGER  
Governor

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**TENTATIVE WDRs FOR CITY OF TRACY AQUIFER STORAGE & RECOVERY WELL**

The Department has reviewed the tentative waiver of Waste Discharge Requirements for the Aquifer Storage and Recovery (ASR) well proposed by the City of Tracy. The Department considers the requirement to "...evaluate the potential for groundwater degradation and the need for removal of THMs and HAAs from the source water due to this activity..." in Item 3 of the Resolution to have some merit; however, **permitting a process that is likely to result in degradation of ground water quality seems to violate the basic responsibility of the Regional Water Quality Control Board (RWQCB) to protect the ground water from degradation. The potential for ground water contamination should be determined before the contaminants are injected into the aquifer, and that information should be used to condition the project to avoid any contradiction to the State's policy against degradation of water quality.**

The Department recognizes the need to expand the supply of source waters available to support the population growth that is occurring at remarkable rates, which are predicted to continue far into the future. Since there are environmental concerns that have reversed the trend of previous generations to build dams and reservoirs to store natural runoff available during the wet season to extend the temporal availability of this water through the dry, summer season, alternatives are certainly necessary. Storing abundant winter runoff in existing ground water aquifers has emerged as one of the more environmentally acceptable alternatives. The Department acknowledges the merits of this concept.

Similarly, the City of Tracy is embarking on this specific Aquifer Storage and Recovery (ASR) project to meet concerns of the Department related to the continued and expanded use of water from the Delta Mendota Canal (DMC) as a source of domestic supply for the City of Tracy. Therefore, the Department is a proponent, rather than an opponent, of the ASR program. Since water available from the DMC varies in quality seasonally, the Department is agreeing to permit the expanded use of water from the DMC as a domestic source of supply with the provision that water will be withdrawn from the DMC at extra high rates when the quality of the water available from the Delta is its best and treated and stored so

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that the stored water can be recovered and used for domestic supply when the quality of the water available from the Delta is poor and unacceptable as a source of domestic supply.

However, since many communities in the vicinity of Tracy, and throughout the State, are solely dependent on ground water as their source of supply for domestic use, it is essential that the ground water be protected from contamination and water quality degradation. Therefore, it is most important that the RWQCB assure that this and other projects to store surface waters in ground water aquifers do not degrade the quality of the water available for subsequent extraction and use.

Considering the chemicals that are regulated in drinking water, organic chemicals appear to be the constituent of concern in relation to the ASR program because the water available from the DMC is relatively rich in organic contaminants. While the proposed waiver addresses monitoring for Trihalomethanes (THMs) and Haloacetic Acids (HAAs) there are numerous other Disinfection By-Products (DBPs) and DBP precursor organic chemicals that are also found in waters that are taken from the Delta, treated, and disinfected. In addition, discharges of treated municipal wastewater into the tributaries to the Delta add low levels of pharmaceuticals and endocrine disruptors to array of organic contaminants found in water from the Delta. Therefore, some monitoring would be appropriate for these additional organic contaminants. Since this is such a large and diverse group of chemicals, it may not be generally practical to monitor for all, or even a significant number of these organic contaminants. However, it is relatively inexpensive to monitor levels of Total Organic Carbon (TOC) as some measure of these additional organics and as a measure of the balance between TOC in the injected water and in the extracted water. TOC should also be measured in the monitoring wells as an indicator of migration of these compounds. If one or more organic contaminants can be identified as a common contaminant that occurs at detectable levels in water in the DMC, tracking one or more of these chemicals would provide another important indicator of potential ground water contamination and a balance of such constituents between the injected water and the extracted water would provide an indication of possible adsorption or degradation of these other contaminants.

The designers of the ASR project indicate that THMs and HAAs are currently being injected into ground water aquifers in other parts of the State. However, they indicate that upon extracting the water, these DBPs are not found in the recovered water. It is hypothesized that these chemicals are being degraded through biometabolism by microorganisms indigenous to the ground water aquifers or that the chemicals are being adsorbed to the materials of the aquifer matrix. If the removal mechanism is adsorption, operation of an ASR over a long enough period of time will saturate the adsorptive capacity of the aquifers, at which point extracted water will again be contaminated with these compounds at levels comparable to those in the injected water, and possibly much higher.

MONITORING



On the other hand, if degradation is occurring, the process should be investigated to provide further information relevant to the degradation by-products. The nature of the degradation products should be qualified and quantified to assure that unacceptable degradation of the ground water is not accompanying the process. It is likely this process could be reproduced in the laboratory where the same conditions with respect to pressure, temperature, anaerobic conditions, and other conditions could be reproduced in a controlled environment in which all of the by-products could be recovered and identified. Even the microorganisms found in the aquifers could be recovered from the relevant zones during the drilling of a monitoring well in the vicinity of the ASR well and transferred into the laboratory environment that reproduces the conditions found in the ASR. If such a demonstration verified that the DBPs are degrading into an array of by-products that have no public health implications and that cause no ground water degradation, the question regarding the fate of DBPs in the environment would be satisfactorily addressed.

In addressing ground water contamination, it has been found that the common contaminant, tetrachloroethene, degrades in ground water aquifers to yield trichloroethene, vinyl chloride, and other degradation products. If a discharger limited its monitoring strictly to tetrachloroethene, it would appear that the contamination is resolving itself through the degradation of this chlorinated solvent over time. However, such an approach would ignore the breakdown of the tetrachloroethene into a much more hazardous contaminant, vinyl chloride. This example illustrates the value of knowing with certainty the breakdown reactions that are occurring, as chemicals appear to disappear from an aquifer environment.

Similarly, the RWQCB has taken enforcement actions against dischargers such as Georgia Pacific, Pioneer American (previously All Pure Chemical), and Triple E Packing in the Tracy area for contaminating ground water with chloroform, one of the THMs. It appears there may be a significant fundamental flaw in mandating remedial action when one set of dischargers releases a DBP into the ground water, while permitting another discharger to inject very significant amount of the same contaminant into the ground water.

Perhaps the two cycles of aquifer storage and recovery addressed in the proposed waiver can be permitted with the understanding that they might result in a contamination that can later be addressed with a Clean Up and Abatement Order similar to those imposed on other dischargers in the State. On the other hand, it may more prudent to prove the nature of any degradation of THMs and HAAs that might be occurring in the ground water aquifers, to identify the chemical nature of the break-down products, to extend these investigations to other DBPs and precursor organics found in treated Delta waters, and draw conclusions relevant to the long term public health and ground water quality implications of the proposed project before ASR is approved without an organic contaminant removal element.

The technology is well developed and readily available to remove the identified and regulated DBPs, along with the numerous other DBPs, DBP

precursors, pharmaceuticals, endocrine disruptors, and other organic contaminants from water. Since these contaminants are not removed from the Delta source water by conventional sand filtration of that water, Granular Activated Carbon (GAC) treatment of the filtered water, before it is injected into the ASR well, should be required as a public health protective measure that would also avoid degradation of the ground water quality.

The project should include enough, properly placed monitoring wells to allow the City to verify the ground water gradient throughout the duration of the demonstration program. Although a gradient was established in December 2003, seasonal variations in pumping in the area could result in changes in the gradient with time and other factors. Since it is important to determine if stored water is migrating from the storage area, good operation of an adequate number of properly placed monitoring wells is essential.

Thank you for the opportunity to comment on the proposed resolution. If you have any questions regarding this matter, contact me at (209) 948-3816.

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cc: Dr. Nicholas Pinhey, City of Tracy

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